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Translator's Comments

I am very pleased to introduce this wonderful "Ariocarpus Hand Book" to English-speaking cactophiles from around the world. The author, Mr. Kouzui Suguri, is a famous cactophile and one of the best growers in Japan. If you like the genus Ariocarpus, I recommend that you purchase this book. Also, I would like to thank the publisher, Mr. T. Sato, who is the largest publisher of cactus and succulent books in Japan. If you would like to purchase this book or other related plant photo books from Japan, you should visit [Mr. Sato's web site](#) where you will find some nice photo books.

I hope this brief translation contributes to increased understanding of the genus Ariocarpus, the primary goal of the Handbook. I also would like to express my sincere thanks to Dr. Paul Greenbaum, who edited this translation.

All cultivation tips are for plants on their own roots and not for grafted plants.

« » Brackets are used for translator's notes.

General remarks of Genus Ariocarpus by Mr. Kouzui Suguri published in January 1996

(Brief translation by Yowichirow Matsuoka)
(Editing by Paul Greenbaum)

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<Preface>

Ariocarpus have been in Japan for a long time and always have been popular. In the past, many Ariocarpus were imported from Mexico, but nowadays none are imported. In their native habitat, populations have declined because of development and fewer locations exist where these plants may be found. Because we no longer can obtain any collected plants, we should propagate seedlings to maintain the species and expand our skill at growing cactus. We need to keep growing those Ariocarpus being cultivated in Japan, not only for our enjoyment, but also for producing future generations. I hope this book will be useful for growers in the future. I thank Mr. Tsutomu Sato, Mr. Masaomi Takeo, Mr. Katsuichi Yamashiro, Mr. Masaki Nishi, and Mr. Aikichi Kobayashi, who helped me in writing this book and share similar views.

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< Introduction >

I do not discuss taxonomy or classification of the genus, as I consider myself an amateur in this regard. Instead, I would like to discuss my observations about cultivation and breeding that result from my many years of growing these plants and my conversations with other growers.

< Details >

Ariocarpus lloydii

They grow in Coahuila, Durango, and Zacatecas in Mexico. Parras Coahuila is famous for A. lloydii. The best plants, which have large tubercles, come from the backcountry of Durango. However, today, these may be extinct. Fortunately, genes for large tubercles are dominant, and there are many plants with large tubercles that grow in the same location. Large tubercles also occur among other Ariocarpus species. Many A. lloydii grow near to A. fissuratus. As the range of A. fissuratus is greater than that of A. lloydii, I believe that A. lloydii may have evolved later than A. fissuratus. Additional evidence for this idea derives from the existence of A. intermedius. Mr. Rose (Dr. J.N.Rose?) considered A. lloydii as a variety of A. fissuratus (He treated A. lloydii as a synonym). I rather agree with him. In Japan, the large tubercle A. lloydii is called "O-ibo-renzan" (O-ibo means large tubercles, and renzan is the Japanese common name of Ariocarpus lloydii). Many consider O-ibo as the best form for many types of plants and

among *A. lloydii*, it occurs rarely, (i.e., one out of several hundred). As mentioned above, many O-ibo-renzan grow in the same location and look like O-ibo-renzan, but they have few tubercles rather than having large tubercles. It is similar to what occurs in three- and five-ribbed *Astrophytum myriostigma*. If they are the same diameter, the three-ribbed has larger tubercles than the five-ribbed. This rule also is applicable to other *Ariocarpus* species. As to cultivation, the roots of *A. lloydii* are very delicate, so you have to treat them carefully when repotting. *A. lloydii* roots are similar to *Ariocarpus scapharostrus* roots, so treat both carefully.

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Ariocarpus fissuratus

An explanation of habitat...

Ariocarpus fissuratus seedlings dislike strong light and dry conditions. Eventually, as they become mature, they attain a maximum size of 25 to 27 cm. However, old plants become senile and have a tendency to succumb to disease and a weak root system. At this stage, as is well known, they die suddenly. So, after they reach 20 cm in diameter, I grow them slowly, and adopt a new repotting period, using intervals of every 2 - 3 years. Additionally, I grow them under drier conditions or with stronger sunlight.

difference between *A. fissuratus* and *A. lloydii*.

My observations come from growing these plants in cultivation rather than from field studies. Once, I had remarkable results of a seedling of *A. fissuratus* developing from *A. lloydii* seed. Additionally, seedlings of *A. lloydii* sometimes look similar to *A. fissuratus*. However, seed of *A. fissuratus* never results in *A. lloydii*-like seedlings. My hypothesis is that *A. fissuratus* is the earlier, more primitive form with some early ancestors having diverged to become *A. lloydii* and *A. intermedius* forms. Additionally, *A. hintonii* is a highland or southern form from isolated line. Observe all four species yourself and consider these observations.

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Ariocarpus intermedius

Cultivation is similar to *A. fissuratus*, but growth is faster than in either *A. lloydii* or *A. fissuratus*. As with *A. retusus*, the tissue is soft and juicy.

Ariocarpus fissuratus* var. *hintonii

This species was discovered in 1981. I consider this species to be a local form of *Ariocarpus fissuratus*, similar to the relationship between *A. kotschoubeyanus* and *A. kotschoubeyanus* var. *macdowellii*. If you want a complete *Ariocarpus* collection, you should grow this. I am not sure of the exact location, but based on conversations with others, guess Matehuala or surrounding environs.

Ariocarpus kotschoubeyanus

An explanation of habitat...

Ariocarpus kotschoubeyanus is the toughest species in the genus, because it is a vigorous grower (e.g., in the case of cutting off the head). However, older mature specimens may die suddenly, due to decreased resistance to disease. I estimate their life span in cultivation as between 15-20 years. Old specimens tend to become crested or clustered. In fact, in habitat, crested forms exist at a high ratio to normal forms. Of course, they exist as crests as young plants, so they have inherited a gene for crested. Typically, their growth is vigorous and they begin to flower after five years at a size of 5 - 6 cm. If they are in optimum conditions, they will increase their diameter 0.5 - 1.0 cm per year. After 8-10 years, a well-grown seedling will grow to 10 cm in diameter. During the juvenile period, a seedling's body grows more rapidly than its tubercle or leaf, but the mortality rate is high. It is important to understand that to make large specimens of *Ariocarpus*, their growing conditions as little seedlings will determine their future size, (i.e. whether or not they become large specimens). Therefore, you should adopt a bold cultivation technique to get nice large specimens. I assume that each cell adapts to large amounts of water and nourishment. The body grows robustly, but in exchange for decreased resistance to germs and disease.

Ariocarpus kotschoubeyanus* var. *macdowellii

An explanation of habitat...

Ariocarpus kotschoubeyanus var. *macdowellii* is less robust than *Ariocarpus kotschoubeyanus* and its root system is meager. This species prefers drier conditions than *A. kotschoubeyanus*, so it easily rots in cultivation. Actually, it seems to wither rather than rot. Seedlings do adapt to Japanese greenhouse conditions, however, they are never eager to become large. There are many forms; a large elongated bulbous form, a small body form, a small leaf form;

similar to a form of *A. kotschoubeyanus*, etc. Many of the large bulbous form with numerous small tubercles were imported from Queretaro, however, today, few are available.

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Ariocarpus retusus

snip: An explanation of habitat

This species has many diverse forms, such as thin tubercles, thick tubercles, long tubercles, split into two or three tubercles, rough-surfaced tubercles, and woolly trench forms, etc. All of these different varieties lead us to collect them with enthusiasm. The plants are tough and grow vigorously. Seedlings flower and reach maturity within 6 - 7 years after germination. Flowers appear in September or November, with colors ranging from cream-colored to pink. Flowers have lots of pollen and a firm pistil. The species is resistant to disease. The most common cause of death is bacillus, which breed in the carcass of scale insects. The root system has few turnip-like tuberous roots and many small, fine roots. Crests are very rare, and only crests of *Ariocarpus furfuraceus* are available commercially.

An explanation of *A. retusus* var. *major*.

As very small seedlings, they need little sunlight, which can be obtained by using "KANREISHA" (shade cloth) under strong sun. Grow seedlings so that they have a slender shape with tubercles raised upward. Also, pay attention to disease and take precautions against it. Tall seedlings will produce a superior plant. I give a lot of water to seedlings during this period and, consequently, any weak seedlings will die. However, after the first year, the surviving seedlings will have resistance to disease. I use a simple soil mix, rich in oxygen, but minimize fertilizing. Two-year old seedlings will reach 2-3 cm in width and 3-5 cm in height. In the third year, I try to make a strong root system; this is an important point. The soil mix (i.e., AKADAMA 6, HYUGA 3, KANUMA 1) contains a little fertilizer for root growth. I use a small pot for each plant and get strong roots. Then, I grow them in earnest.

«Annotation start»

AKADAMA = brown colored loamy soil, a bit heavy. Common in suburbs of Tokyo.

HYUGA = whitish khaki colored pumice, lightweight, absorbs water.

KANUMA = whitish yellow colored pumice, very lightweight, absorbs water, brittle.

«Annotation end»

Keep the same cultivation through years 4 and 5, in spite of tall shape. In 6-year old seedlings, tubercles become large and need increased sunlight. This also is an important growth period as their adult form will be formed by strong light, but you will need to avoid sunburn. In 7th year, they will have a good adult appearance, a massive fat and flat body.

These 7 years require patience for me. However, I believe that I have to pass on those plants with good growth to the next generation. A person who has a good plant must pass it on to another person. Everyone hopes to cultivate a good plant, so those who have a good plant should pass the plant on to future generations. «Mr. K. Suguri is a Buddhist priest»

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Ariocarpus furfuraceus

An explanation of habitat

An explanation of the difference between *A. retusus* and *A. furfuraceus*.

The monstrosa (see photo) is one of the best cacti I have found during my cactus hobby. It was 12 years ago that a certain importer called me to sell a huge number of just-imported cacti. The nursery owner showed me an odd *Ariocarpus*. It looked very strange and mysterious, like a crumpled monster. However, I looked carefully and saw what seemed like *A. furfuraceus* with very rough tubercles. The tubercles were chained and formed a line with a cylinder-like shape. The plant had no fine roots and no tuberous rootstock, more like an *Obregonia denegrii*. Its flower was small and yielded very few seed, approx. 10-15 seed per fruit. I have crossed this plant with a similar formed *A. furfuraceus* and got a few seedlings. The original plant died suddenly two years ago. I much regret that sad incident. However, I asked an acquaintance to save the plant by cloning technique. It made a callus, but that was all. I sowed seed three times and obtained dozens of seedlings. From this batch, I guess that four seedlings at least, inherited the strange form. Someday, I hope they will return to my green house.

«Mr.Suguri imply that he sold (or hand over) all seedling to somebody. So he would like to get the plant again»

I have heard of a location that has many crested *A. furfuraceus*, however, I don't know where it is exactly. As you know, there exist some local variants of *A. furfuraceus*, such as "Zouge-Botan." I consider that species is just a large form of *A. furfuraceus*, in spite of rumors that it is a distinct species. I think their habitat is south of Ciudad Victoria or west of Jaumave. Someday, I hope to visit there.

Another form, "Seiji-Botan" is also a form of *A. furfuraceus*. I have visited its habitat and found many forms, (i.e., "Seiji type", ordinary type, and even similar form of "Zouge."). Most experienced importers know that "Seiji" type can be found among large numbers of imported *A. furfuraceus*. I see no clear differences that would permit three classifications: *Ariocarpus furfuraceus*, "Seiji" and "Zouge."

Ariocarpus scapharostrus

An explanation of habitat

This species grows rapidly in our conditions, but many rot. They will grow well until 5 centimeters, some say 8 centimeters, and then cease growing. However, I do not have enough data to say for sure. Imported plants of *A. scapharostrus* sometimes have grown to 10-15 centimeters. This species grows good for an *Ariocarpus*, but often rots, especially as an old plant. So be careful.

Ariocarpus trigonus

An explanation of habitat

This is one of my favorite species in *Ariocarpus*. This species, metaphorically speaking, is like *Echinocactus grusonii* among the rest of the cactus world. It has a nice form with many wide tubercles. *A. trigonus* var. *elongatus* is the preferred form. A round tubercle form, which has been in cultivation for many years, seems more like *A. retusus* than *A. trigonus*. Another form, with tubercles curved-upwards, is desirable, but very rare in cultivation.

I think that an *A. trigonus* in full bloom with many flowers is the best in the genus.

Ariocarpus agavoides

An explanation of habitat and shape.

It will grow into a cluster when grafted. Some old imported specimens also have become clusters.

This species flowers as readily as *A. kotschoubeyanus*, but differs in flower shape. I wonder if this species may be isolated from other *Ariocarpus* habitats? I have observed a strange *Anocarpus* species growing in the same locality as *Obregonia denegrii*. One of these, a juvenile, was growing under a shrub and its tuberous root was very fat. Additionally, the tubercles were very soft, just like in *A. agavoides*. As you know, tubercles of *A. trigonus* are very stiff and their roots are cone-shaped. I asked myself "What is this species?" and was reluctant to leave. Perhaps this plant is the missing link between *A. agavoides* and *A. trigonus*?

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Ariocarpus sp. "Miyabi-botan"

This species similar to *A. retusus* and *A. trigonus*, with some additional elements from *A. furfuraceus*. I don't know their habitat. I guess they are a regional species. Today, there exist some hybrids between this and other *Ariocarpus* species.

Ariocarpus sp. "Zouge-botan"

An explanation of habitat

As stated earlier, I consider "Zouge-botan" as the king of *Ariocarpus* and I have been very interested in the species. No location data exist for them as they were imported to Japan, but I would like to see a big colony in habitat. Cultivation is the same as for the type, *A. retusus*; however, their roots are poor compared to the size of their own body. Some imported plants came with fine clay, so they may grow near bushes or in forest niches. They have a variety of tubercle types, such as bony, warty, divided, and large. What is such an exceptionally large tubercle for?

Ariocarpus bravoanus

An explanation of habitat

This species may be missing link among *A. fissuratus*, *A. hintonii*, and *A. kotschoubeyanus*. It is very difficult to know, but it possibly may come from a mountain area around Matehuala SLP.

Ariocarpus sp. nova

The Ariocarpus pictured here is the only one that exists in Japan being 4 - 5 cm across. It is similar to *A. fissuratus* and *A. kotschoubeyanus*.

An explanation of shape

As Ariocarpus can cross with other species in nature, there is a need to confirm its location and habitat before publishing it as a new Ariocarpus species.

<A discussion of details>

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Ariocarpus agavoides

Ariocarpus agavoides has tubercles that spread out to 4-5 cm wide, a small body, and tuberous turnip-like roots. It also has an areole on top of the tubercle. The outer skin is deep green. The only known habitat location is Tula, Tamaulipas. It is rumored that the species is threatened. However, I don't think that is likely since the time it takes to grow them to flowering is short, within 3 to 4 years. When they first were imported into Japan, there were very few plants, so a rumor spread that they were the rarest. They traded at very high prices. Mr. Curt Backeberg was convinced that *Mammillaria theresae* was another related species.

Photo:

Right-Top... In flower

Right-Second... many-tubercle type

Right-Third... variegated

Right-Bottom... big cluster

Left-Top... long-tubercle type

Left-Bottom... nicely arranged cluster

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Ariocarpus bravoanus

This species is related to *A. agavoides*. It was found north of SLP, but their location was not made public so as to thwart illegal collecting. This species also is related to *A. fissuratus* v. *hintonii*. It has been confirmed that the colony consists of 230 plants and has been recognized as a bona fide new member of the genus. It was not imported to Japan, but it will be popular when seeds become available, as it is a small species.

New species (A) (Two photos / Left bottom & Right Top)

This species was found growing within the habitat of *A. trigonus*. Its tubercle is soft, similar to *A. agavoides*. I wonder if the species may be a natural hybrid between *A. trigonus* and *A. agavoides* because many *A. trigonus* grow nearby.

New species (B) (Two photos / Right Middle & Right Bottom)

These plants were found mixed in with a huge number of imported plants of *A. retusus*. I don't know for sure, but I believe that it has some relationship with *Miyabi-botan*.

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Ariocarpus fissuratus

The most desirable forms have a groove (gutter) in the tubercle that is either deeper or different from what is usually seen. This species was first introduced in 1917. After importation, many plants of this species died suddenly during re-rooting. Today, there are not so many, even though huge plants were imported into Japan. An attractive shape is the likely reason for this species to have become very popular.

Photo:

Left-Top... blooming cluster

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Right-bottom... cluster

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Upper left spiraled-tubercle type}
Upper right variegated
Middle left another spiraled-tubercle type
Middle right variegated and crested
Lower splendid pattern of variegation

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Ariocarpus fissuratus var. hintonii

This species was discovered south of Matehuala, SLP at an elevation of 1600 meter. Typical size is 6 cm across and does not exceed 1.5 cm in height. It has a more clearly visible gutter and is smaller than the type, *A. fissuratus*. They were recognized as a distinct variety because of *hintonii*'s geographic isolation from *Ariocarpus fissuratus* and *Ariocarpus fissuratus* var. *lloydii* by the Sierra Madre Mountains. Additionally, no one has found an intermediate form between these two varieties,

Characteristic and handsome form is nice, but small body is unsatisfactory.

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Ariocarpus intermedius

The original Japanese common name was given by Mr. You Ryutanji. The new common name was given by Mr. K. Yamashiro. The habitat of this species is located between *A. fissuratus* and *A. lloydii* and the plants show much variation. They have some clear differences from *A. lloydii*, such as more acute angle and many tubercles. Also, their size is greater than *A. lloydii*, (i.e., much bigger than *A. fissuratus*). The maximum size in nature will be 16 cm or more and in cultivation may reach 20 cm across. There are many spiral-tubercle and deeply- grooved tubercle forms. Seedlings grow up to 4 to 5 cm, and are very similar to *A. fissuratus*. Sometime this species is called "MEKISICO-KIKKOU" (Mexican *A. fissuratus* in Japanese).

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Lower-Left fig. Deeply-grooved form

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Middle-Left... cluster
Lower-Left... divided tubercle form (expensive in Japan)

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Ariocarpus fissuratus "lloydii type"

Ariocarpus lloydii-type has a similar shape as *Ariocarpus fissuratus*, but *lloydii*-type has plumper tubercles and grows larger than *Ariocarpus fissuratus*. This *lloydii*-type belongs to *Ariocarpus lloydii*, on the other hand there is no *A. fissuratus* which is similar to *A. lloydii*.

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Ariocarpus fissuratus v. *lloydii* «common type»

This species is the slowest growing in the genus.

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Left top: variegated

Left mid: rounded and smooth tubercle type
Left Bot: cluster
Right top: crested
Right mid: crested
Right bot: crested

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Left top: large crested A. lloydii
Left mid: variegated
Left Bot: variegated, but light color
Right top: variegated

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Ariocarpus fissuratus v. lloydii (major type)
These are distinguished from the original species type by having large tubercles, but that is based on plants in cultivation. Presumably, there is a locality for these large tubercle types in habitat, but I don't know for sure,

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Left top:
Left mid:
Left Bot:
Right top:
Right mid: large and rounded tubercle
Right bot:

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Ariocarpus kotschoubeyanus

It may reach 12 cm across in cultivation,

Left top: many-tubercle type
Left mid: with copious white woolly tufts
Right top:
Right mid:
Right bot:
A result of using "BA-drug" «offset attractant»

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Left top: smooth surface on tubercle (very rare)
Left mid: large specimen
Left Bot: large cluster
Right top: spiraled- tubercles
Right mid: crested
Right bot: enormous crested specimen

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Left top: circle-shaped crest.
Left upper mid: double flower
Left lower mid: variegated
Left Bot: abnormal offset
Right Bot: monstrosa?

Ariocarpus kotschoubeyanus v. elephantidens

Very rough surface on the tubercles distinguishes this species from the type.

Right top:
Right mid: unnatural offset

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Ariocarpus kotschoubeyanus v. macdowellii

There are a variety of flower colors and body sizes.

Left top:
Left bot: diversity in flower color
Right top:
Right mid: clustered specimen, cultivated for a long time
Right bot: splendid cluster

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Left top: variegated
Left mid: crested
Ariocarpus kotschoubeyanus v. albiflorus
This species has much smaller tubercles than Ariocarpus kotschoubeyanus v. macdowellii.

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Ariocarpus scapharostrus

Under cultivation, they develop thick tubercles,

Left top:
Left bot:
Right top: short tubercle «Japanese prefer this form than Left top one»
Right mid: warped tubercle
Right bot:

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Left top: large cluster produced by grafting
Left mid: stripe in tubercle's center
Left Bot: wrinkled tubercle
Right top: cracked tubercle
Right mid: variegated
Right bot: variegated

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Ariocarpus retusus

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Left top:
Left upp:
Left low:
Left bot: wrinkled tubercle
Right top: yellow flower «a misprint? I observe white one»
Right upp: yellow flower
Right low: crested
Right bot: crested

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Left top:

Left upp: stripe in tubercle's center part

Left low: stripe in tubercle's center part

Left bot: split tubercle

Right top: stripe in tubercle's center part

Right upp: long areole type

Right low: long areole type

Right bot: split tubercle with many areoles «monstrosa?»

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Left top: split tubercle

Left upp: variegated around tubercle's edge

Left low: wrinkled tubercle

Left bot: variegated

Right top: variegated

Right upp: variegated

Right low: variegated

Right bot: variegated

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Ariocarpus retusus "escontrado"

I don't know this species very well because I haven't seen many. I wonder if ESCONDORAD is a place name? «
La Escondida, Nuevo Leon»

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Ariocarpus retusus "thick leaf type"

This species has short and fat tubercles.

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Left top:

Left mid:

Left Bot:

Right top: stripe in tubercle's center part

Right mid: split tubercle

Right bot: variegated (A. elongatus)

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Ariocarpus retusus "Major type"

In earlier times, these large tubercle A. retusus were called "Tama-botan" in Japan. Today, Tama-botan is generic name for wide tubercle A. retusus.

A plant that epitomizes the characteristics of the type may be called by its nickname and is very much prized.

Left top:

Left Bot: "Royal Tama-botan" «- nick name»

Right top: "King Tama-botan" «- nick name»

Right mid:

Right bot:

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Left top:
Left upp: "Andrey Tama-botan" «- nickname: I don't know what this means.»
Left low:
Left bot:
Right top:
Right upp:
Right low:
Right bot:

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Left top:
Left upp: bamboo grass type
Left low: short & thick leaf type
Left bot: "round leaf Tama-botan"
Right top: split tubercle type
Right upp: split tubercle type
Right low: looks like *Gasteria armstrongii*. At maturity, this plant will not retain this shape.
Right bot: pipe-shaped tubercle.

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Left top: variegated
Left upp: variegated
Left low: variegated
Left bot: variegated (white colored)

Ariocarpus retusus "roseiflorus"

Following photos came from Mr. G. Kohres, in Germany, by the author's request. This species seems like *Ariocarpus retusus*, not *Ariocarpus trigonus*. They produce little reddish flowers. I guess these plants come from a particular location.

Ariocarpus retusus "brostowiczii"

I have seen this species in Austria and it looked like either an *Ariocarpus elongatus* or a narrow tubercle *Ariocarpus retusus*. I have no more information about this species.

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Ariocarpus elongatus

Many slender tubercles grow upwards and have little areoles on top. Body is subdued green. Flower is white and large. The total quantity imported was small. Cactophiles love the narrow tubercle form.

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Ariocarpus retusus "longiareoratus"

The habitat location is the same as that of *Ariocarpus furfuraceus* "magnificus," however, an intermediate form does not exist in this area. Some characteristics are the same as *Ariocarpus furfuraceus* "magnificus;" long areoles and grass green colored body. I consider that this species may be either a species or a variety, similar to *Ariocarpus furfuraceus* "magnificus," which is mentioned below. This species is often confused with *Ariocarpus elongatus*.

Left top:
Left bot: Very wide tubercle type
Right top:
Right upp:
Right low:
Right bot: spiraled tubercle type

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Ariocarpus furfuraceus

The shape of this species is similar to *Ariocarpus retusus*. However, the tubercles have a rough surface and tapers to a sharp tip and areole. The growing point has more wool than in *Ariocarpus retusus*. The body grows up to 12-13 cm and makes clusters over 30 centimeter. Flower color is white to pink and 4-6 cm across. Individual differences are very large.

Left top:

Left mid:

Left bot:

Right top: large tubercle type

Right upp: large areole type

Right low: very rough-surfaced tubercle type

Right bot: large areole type

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Left top: thin tubercle type

Left upp:

Left low: "Sazare" type «Sazare means pebbles in Japanese»

Left bot: multiple tubercle type

Right top: long areole type

Right upp: warty tubercle type

Right low: warty tubercle type

Right bot: warty tubercle type

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Left top: split & multiple tubercle

Left mid: split & multiple tubercle

Left bot: split & multiple tubercle

Right top: multiple tubercle

Right mid: multiple tubercle

Right bot: multiple tubercle

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Left top: split tubercle

Left upp: crested

Left low: crested

Left bot: variegated

Ariocarpus furfuraceus "rostratus"

There form is named "Saikaku-botan" in Japanese. This species has pointed tubercles, which look like a bird's beak. And has spines of 1 -1.2 cm in length. However, I have not seen this plant. If the species exist, *Ariocarpus furfuraceus* with spines, is a peculiar species. The following photos show this "species" that appeared in some seedlings.

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Ariocarpus furfuraceus "magnificus"

This species has long areoles, sometimes over 1 cm in length. Tubercles point downward, are flat and stout, plus rounded and wide. This species caused an unprecedented cacti boom in Japan and has the "ideal" form for *Ariocarpus* mania. "Magnificus" is loved not only by *Ariocarpus* fan, but by all cactophiles, and led to the last big boom. The tubercle is thick and forms an acute angle with swelled surface. Also, it is bigger and fatter than other *Ariocarpus*. The areole is large and lengthy. Skin color is light green and surface is various, from rough to smooth.

Body size is 12 -20 cm across, a single stem, with flowers from 10 -15 cm and a color from white to reddish. This species is the biggest form of *Ariocarpus furfuraceus*. If *Ariocarpus hintonii* is a variety, I guess that "magnificus" is a variety too.

Left Bot:
Right top:
Right mid:
Right bot: special short and thick tubercle with large areole

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Left top: long areole
Left upp: spiraled tubercle
Left low: thin tubercle
Left bot: split tubercle
Right top: very large tubercle
Right upp: short tubercle
Right low: large tubercle
Right bot: comparatively thin tubercle

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Left top: wrinkled tubercle
Left upp: long areole
Left low: split tubercle
Left bot: no areole type
Right top:
Right upp: multiple areoles
Right low: split tubercle
Right bot: split tubercle

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Left top: "U" form areole
Left mid: multiple tubercles
Left bot:
Right top: warty tubercle
Right mid: warty tubercle
Right bot: variegated

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***Ariocarpus furfuraceus* "brevituberosus"**

The body is up to 15 cm, usually 10 -13 cm in diameter and makes a cluster after reaching 12 cm across, like the type; *Ariocarpus furfuraceus*. The tubercle is similar to *Ariocarpus furfuraceus* "magnificus," it is stout, but not pointed on the tip and is smaller than "magnificus." The surface of "brevituberosus" is not rough, but smoother than the type, and similar to *Ariocarpus furfuraceus* "magnificus." The areoles are the smallest in the *Ariocarpus furfuraceus* group. Body color is bluish green with whitish substance on surface. This species is probably a regional variety of *Ariocarpus furfuraceus*. It is popular because of its handsome appearance.

Left top:
Left Bot: deep-grooved tubercle type
Right top: wide tubercle type
Right upp:
Right low: standing tubercle type
Right bot: very stout (i.e., short & thick) tubercle type

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Left top: rough tubercle type
Left upp:
Left low: small tubercle type
Left bot: no areole type
Right top: unequal tubercle type it
Right upp:
Right low: crested
Right bot: crested

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Ariocarpus trigonus

Body color is yellowish green, tubercle is triangular shaped and 3.5 - 6 cm length, 1 -1.5 m wide, tubercle top is curved and forms an acute angle. The surface of the tubercle is smooth.

Left: flowers tend to bloom at the same time
Right top: thick tubercle type
Right upp: huge cluster Bottom:

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Left top: crested
Left upp: crested
Left low: variegated
Left bot: variegated

Ariocarpus trigonus "albiflorus"

The same as the type, but flower is white to pale pink. It may come from a different location.

Ariocarpus trigonus "roseiflorus"

Same as "albiflorus," but flower is pink and not so deep color. A plant with magenta flowers has been recorded.

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Ariocarpus trigonus v. elongatus

This variety has thin and long tubercles, which form a sharp tip.

Ariocarpus trigonus v. minor

This variety also has thin tubercles and is smaller than the type.

Ariocarpus retusus "Spine"

Ariocarpus furfuraceus "rostratus" is known as spine-Ariocarpus. This plant also had spines, and was imported by chance. This is similar to "rostratus." I hope an A. retusus seedling with spines develops from these plants.

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Monstrosa

As a result of the Ariocarpus fad, there were a huge number of seedlings produced that resulted in the appearance of many mutations. These mutations likely would not have survived in habitat, however, they will survive when grafted. Other mutations may appear in future seedlings.

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Chimera

Chimeras are very rare compared to variegated, crested, and monstrosa forms. However, more chimeras appear among Ariocarpus than among any other genus. The stock is either Echinopsis sp. (hybrid?) or Myrtillocactus geometrizans. I have much interest in the genetics of these plants.

Left top: Myrtillocactus geometrizans + Ariocarpus trigonus

Left Bot: Myrtillocactus geometrizans + Ariocarpus scapharostrus

Right top: Myrtillocactus geometrizans + Ariocarpus scapharostrus

Right mid: Myrtillocactus geometrizans + Ariocarpus kotschoubeyanus

Right bot: Echinopsis eyriesii + Ariocarpus retusus

<Growth and cultivation>

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I ask myself why is it that they grow slowly in spite of abundant spreading roots? Possibly, it may be related to the relationship among the root system, watering, and moisture. The bulbous root may provide an answer. Many believe that the bulb is a water storage tank for Ariocarpus. The bulb being eager to absorb water to save for when conditions are dry, but the bulb stops enlarging when water is plentiful. Then, the tubercles grow instead of the bulb. The tubercles are involved with photosynthesis, gathering light like a parabolic antenna. So, when we restrict sunlight, the tubercles grow. Therefore, the plant is eager to increase photosynthesis by developing a fat body and tubercles. I don't know whether this theory is true or not, However, I think so. Another point, sufficient moisture is important for optimum growth with high temperatures during daytime and low temperatures during nighttime. Most cacti make photosynthesis during nighttime. (This process is called Crassulacean Acid Metabolism, CAM). Because the energy from sunlight received during the daytime may be metabolized during the nighttime, the plant needs water to activate this physiological response and grow. Night dew and dewdrops form in habitat and facilitate plant metabolism. Low temperatures (i.e., 18-20 centigrade) are typical during nighttime in inland Mexico,

Appropriate cultural condition for Ariocarpus are different than those of Astrophytum asterias, which is high humidity and high temperature only in daytime. For Ariocarpus, neither humidity nor temperature needs to drop during nighttime. I give my recommendations for cultivation as follows:

« Please consider that the following "tips" are for domestic Japanese cultivation.»

Cultural environment: they need high temperature.

In nature, the best position will be full sun for the whole day, however, in cultivation, do not give full sun, but keep shaded for 2 - 3 hours at morning/evening time. Ariocarpus require a minimum temperature of 5 centigrade (41 F) during winter. This helps in producing rapid growth in the spring. (To tell the truth, Ariocarpus grows very slowly in winter.)

Humidity: needs 60 - 80% in growing season.

It is risky to keep humidity high when the temperature is low. High temperature should accompany high humidity conditions. A good practice is to water the bed/floor during winter, so as to raise humidity in the pot without getting the plant or soil wet.

Ventilation: careful in summer.

Good ventilation is important during rainy season. Also, provide ventilation when temperatures are high.

«Japan has rainy season, June-July. It is very sultry»

Sunlight: abundant soft sunlight.

The most beautiful and robust Ariocarpus grow under shrubs, in stands of grass, and around rocks, which provide protection from the sun. They need some sunlight to keep the roots warm, so provide enough sunlight to raise the temperature inside the pot. For developing the body, a controlled soft sunlight is ideal. Pots should be placed at intervals of 2.5 inches. «Author express this distance as "three finger space"» I use KANREISHA (shade cloth) all year round and double it up in summer. Shade cloth should be over 50% shade. However, this is still strong light for small seedlings.

«KANREISHA is a mesh fabric for agriculture. It is used for reducing sunshine.»

Soil mix: be sensitive

Ariocarpus can grow in any soil, but needs special soil for beauty and vigor. They need a soil that provides good aeration while retaining moisture. These qualities may conflict with each other, so they need harmonious control. Here are some examples. (Manure is available from any nursery, volume ratio)

AKADAMA 80% + KANUMA 10% + PUMICE 10% + some MAGAMP-K and add Manure (20-30% volume ratio for each pot)

AKADAMA 60% + KANUMA 20% + PUMICE 20% + some MAGAMP-K and add Manure (20- 30% volume ratio for each pot)

AKADAMA 50% + KANUMA 30% + PUMICE 20% + some MAGAMP-K and add Manure (20 - 30 % volume ratio for each pot)

Each constituent has to be sieved through a 0.24 inches mesh. Then, by a mesh of 0.12 inches, and, finally, by a 0.06 inch mesh to remove very small particles. It is important to make all constituents the same size to avoid choking the plant in the pot. Nevertheless, Ariocarpus will grow in any soil, if they get suitable and timely care.

« AKADAMA is a loamy soil found in and around Tokyo region »

« KANUMA is also another loamy soil found in and around Kanuma-city »

Manure (and fertilizer): well sterilized

There is no need for very strong manure. On the other hand, if too little is used, the plant will look poorly. I use MagAmp-K for fertilizer in order to avoid excessive amount. You will need to use well-sterilized manure because of the high humidity in the pot.

Watering: for pot and bed

Give full water in springtime. The above mentioned soil mixes may control for excessive water, if you give too much. Apply moderate watering to allow for some drying during the rainy season. In summer, you need to observe drying and control watering with ample ventilation. The end of summer through autumn is a very important season. During this period, the plants need careful and frequent watering so as to pump oxygen into the pot and wash out waste products. Fertilize lightly after flowering so the plants can recover their strength. (I use Hyponex) They will grow until December, if proper conditions are met. It is better to decrease watering gradually up to winter and thereby concentrate their body fluid. If they spend winter in suitable humidity, they will start growth rapidly during the next Spring.

Repotting: ventilating in pot

Whenever the plant is growing vigorously, you can repot Ariocarpus. The best time for repotting is when the cherry blossoms have gone. You need to handle them tenderly when removing plant from the pot and removing the old soil. You can remove old roots, if they are entwined or protruding from the bottom of the pot. However, it is very important that you leave any other roots as is. Particularly, you should not cut roots off *A. lloydii* and *A. fissuratus*, if you can avoid it. If you cut or snap such root, you need to use a fungicide (i.e., Benlate) and let dry it for 2 or 3 days. Large plants should be repotted every two years. Medium sized or small plants have to be repotted every year. The pot should provide ventilation and be attractive. A bit of skill is needed if you use unglazed pottery, because too much heat is radiated and they dry out quickly. It is a good idea to use a pot size that is bigger than the roots by approximately 1 cm, and is made from material that is a good conductor of heat. Therefore, the pot will be smaller than pots containing other genres.

Seedlings

Seed should be harvested in May - June, wash well and mix with Benlate for preservation. A wait of 3-4 weeks is needed before being ready for sowing. I usually sow them in July or September, so as to avoid failure by immediate sowing. It is difficult to provide optimum growing conditions in western Japan during August, but in cooler regions you may succeed.

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Classification for Ariocarpus

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field map of native habitats

Ariocarpus can be found from southern Texas to SLP, Mexico, in the highlands of Chihuahua. I consulted some literature and made the map below. The species don't inhabit each area with a uniform density. Instead, each range is dotted with small colonies. The amount of rainfall in these areas is between 250 - 500 mm during the hottest

season, from June to September. Growth flourishes during this season from rainstorms. In contrast, the dry season has little rainfall, so Ariocarpus lose 30- 40% of their water and their bodies shrink 20 % in diameter. This cycle will be repeated throughout the growing period. Under these circumstances, Ariocarpus species may move their habitat by the changing environment. In each region, some peculiar colony apparently exists as a result of long term changes spread out over generations. When remote areas are explored, new forms may be discovered. It is not the best conditions for Ariocarpus even though they survive, so under the more generous conditions of cultivation, they grow large.

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Ariocarpus ssp. in habitat

Left top:

Left mid:

Left bot:

Right top: Matehuala

Right mid: Matehuala

Right bot:

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Photo by Mr. Takeo of the location of A. fur. "magnificus"

Left top:

Left upp:

Left low:

Left bot:

Right top:

Right upp:

Right low:

Right bot: The nearest train station for the habitat of A. fur. "magnificus."

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Photo by Mr. T. Suguri of the habitat of A. trigonus

Left top:

Left mid:

Leftbot:

Right top:

Right mid:

Right bot: This photo was taken by Mr. Takeo

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Left top: Cuatrociénegas, photo by Mr.H.Kobayashi

Left upp: Valley of E. grusonii and Ariocarpus kotschoubeyanus photo by Mr. Suguri

Left low: photo by Mr. Suguri

Left bot: Rayones photo by Mr. Suguri

Right top: photo by Mr.H.Kobayashi

Right upp: photo by Mr. Suguri

Right low: photo by Mr. Suguri

Right bot: Rayones photo by Mr. Suguri

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left column

Variegated Ariocarpus ssp.

We Japanese have loved variegated plants since ancient times and this is also the case among growers of cactus. As Ariocarpus became popular, some variegated Ariocarpus species appeared in the market. But, they were hybrids and many people were disappointed. Subsequently, huge numbers of Ariocarpus were imported and some variegated plants were found. Mr. T. Sato had been collecting them and sold some to Mr. K. Kikuchi. He has good

skills at propagating, and supplied many good variegated seedlings to the cactus market. These included A. trigonus, A. retusus and, more recently, A. lloydii. We learned by experience that in the case of A. trigonus or A. lloydii, paternal characteristics [such as variegation] are inherited more strongly than maternal characteristics. A handsome Ariocarpus with yellow or red colored variegation will be prized as a jewel among a cactus fancier's collection.. However, I don't prize variegated Ariocarpus that are hybrids.

right column

Cristata and Monstrosa

Cristata forms have been known and traded as rare Ariocarpus for some time. Many kinds of Ariocarpus crests exist because of the huge numbers that were imported. Especially, several hundred cristata of Ariocarpus furfuraceus were imported that all came from the same location. Most of them were large plants, so many of them wound up rotting. A cristata will appear when the plant is a large size, not as a small seedling. Therefore, they are hard to propagate. On the other hand, some monstrosa appear as seedlings. Presently, I have never seen crests of the following species, Ariocarpus agavoides, Ariocarpus fissuratus, Anocarpus scapharostrus

Bottom column

Propagation by tubercles.

It is important for rooting to leave some tissue on basal-side of the tubercle. Large tubercles will yield good results. This technique usually will not succeed with Roseocactus, (old classification), however, I believe they will succeed under proper conditions.

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Hybrids among Ariocarpus

There are many kinds of hybrids. In most cases, the aim is to make variegated plants. These hybrids provide a glimpse into the evolution of Ariocarpus. For example, A. trigonus, A. retusus, and A. furfuraceus are evolutionary close. A. lloydii, A. intermedius, and A. fissuratus make another group. These two groups are distant relatives. Additionally, three species, A. agavoides, A. scapharostrus, and A. kotschoubeyanus, are also distant relatives. Hybrids between near relatives make no abnormal or variegated seedlings. However, hybrids between distant relatives produce many variegated albino plants. These results may help in developing a classification of Ariocarpus.

[All photo shows hybrid plants]

Left top:

Left mid:

Left bot: Top of tubercle curves to form apex.

Right top: A hybrid even though it looks like A. scapharostrus

Right mid: Looks like A. trigonus with short tubercles.

Right bot: This plant looks like the newest species.

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<http://www2f.biglobe.ne.jp/~nekoya/ariohb.htm> 12/03/2000